

Enhancing the agricultural monitoring and crop production forecasting capabilities of the Foreign Agricultural Service using moderate resolution satellite data



A collaboration between NASA/GSFC, USDA/FAS, SSAI, and UMD Department of Geography

III. Contact Information & Links

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Related Websites

GLAM Global Agriculture Monitoring
<https://tripwire.geog.umd.edu/usda>

MODIS Rapid Response System
<http://rapidfire.sci.gsfc.nasa.gov/>

GIMMS Global Inventory Monitoring and Modeling
<http://ltpwww.gsfc.nasa.gov/gimms/htdocs>

USDA Crop Explorer
<http://www.pecad.fas.usda.gov/cropexplorer>

USDA Foreign Agricultural Service
<http://www.fas.usda.gov/>

NASA USDA Partnership
<http://www.esa.ssc.nasa.gov/pships/usda.aspx>

University of Maryland, Geography Department
<http://www.geog.umd.edu/>

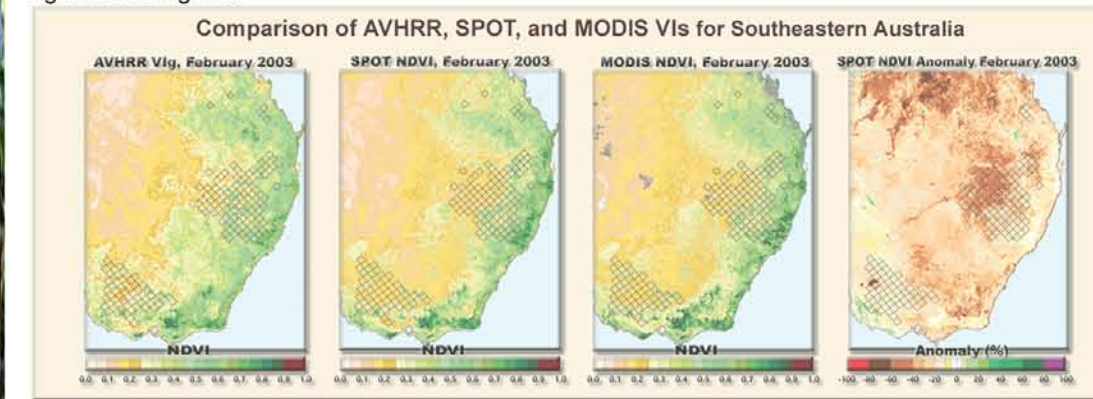
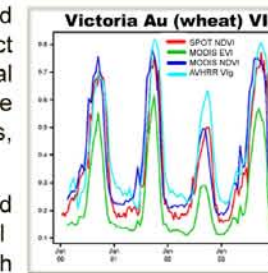
MODIS Land Discipline
<http://modis-land.gsfc.nasa.gov/>

C. Long-Term Monitoring An inter-sensor Calibration

The Global Inventory Monitoring and Modeling Studies (GIMMS) group at NASA Goddard Space Flight Center (NASA/GSFC) provides USDA/FAS with global data stream of NDVI that spans over two decades (1981-present). The GIMMS NDVI is derived from measurements made by the Advanced Very High Resolution Radiometer (AVHRR), Global Area Coverage (GAC) data from the National Atmospheric Oceanic Administration (NOAA) polar orbiting series of satellites. GIMMS has inter-calibrated the data from the NOAA-AVHRR satellite series and performed atmospheric correction to minimize the effects of volcanic aerosols to produce and maintain a consistent NDVI archive. The NDVI archive from GIMMS provides the historic database for monitoring the response of vegetation to climatic conditions.

Linking the MODIS data to the long-term GIMMS AVHRR/NDVI archive and to SPOT Vegetation sensor data is a critical component of this project providing a consistent multi-source long-term data record for agricultural monitoring. This allows FAS analysts to compare current data with the spatial extent and severity of NDVI anomalies associated with heat stress, droughts and floods associated with crop failures.

VIs from different sensors are related by examining their temporal and spatial behavior (means, ranges, and anomalies) at target FAS agricultural regions throughout the globe and interpreting these statistical patterns with respect to the growing seasons for various crops. The aim of this project component is to build a consistent time series that best represents the vegetation dynamics over these agricultural regions.



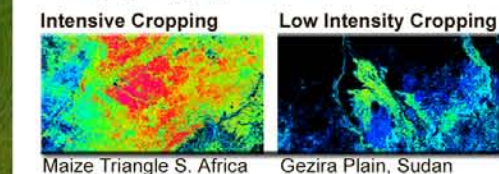
D. Enhanced Cropland Products using MODIS

A Dynamic Continuous Cropland Mask for use with MODIS time-series web interface

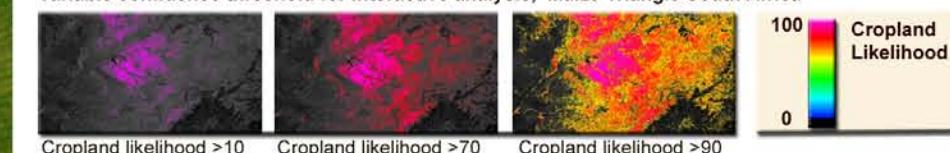
To successfully monitor worldwide agricultural regions and provide accurate agricultural production assessments, it is important to understand the spatial distribution of croplands. To do this, GLAM has developed a global croplands mask to identify all sites used for crop production.

Croplands are highly variable both temporally and spatially. Croplands vary from year to year due to events such as drought and fallow periods, and they vastly differ across the globe in accordance with characteristics such as cropping intensity and field size. A flexible crop likelihood mask is used to help depict these varying characteristics of global crop cover. This flexible croplands mask is generated by analysis of 4 years of MODIS data (2001-2004). Such a dynamic mask allows FAS analysts, through the MODIS time series web interface, to threshold cropland membership according to their needs and region of interest.

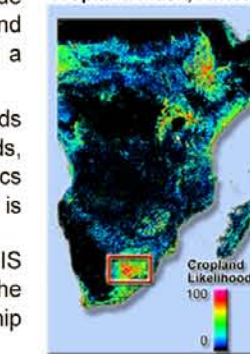
Regions featuring intensive agro-industrial farming practices such as the Maize Triangle in South Africa will have higher confidence values in the crop mask as compared to less intensively farmed regions in parts of Sub-Saharan Africa where cropland identification is partly confounded with natural background vegetation phenologies. Thus, a customized threshold can be employed to examine areas of varying cropping intensification.



Variable confidence threshold for interactive analysis, Maize Triangle South Africa



Cropland Mask, Africa



Continuous crop mask (CCM) functionality within MODIS NDVI time-series web interface
Maize Triangle crop region, South Africa

